

LOW COEFFICIENT OF THERMAL EXPANSION
CERMET COMPOSITIONS

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ABSTRACT OF THE DISCLOSURE

Low coefficient of thermal expansion (CTE) cermet compositions of this invention generally comprise a hard phase material and a ductile phase formed from a binder alloy, wherein the binder alloy is specially designed having a CTE that is closely matched to the hard phase material. Hard phase materials used to form low CTE compositions of this invention are selected from the group of carbides consisting of W, Ti, Mo, Nb, V, Si, Hf, Ta, and Cr carbides. The binder alloy is formed from a mixture of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr, and Mn. In a preferred embodiment, low CTE compositions comprises WC as the hard phase material, and a ductile phase binder alloy formed from a mixture of Fe, Co, and Ni. The so-formed low CTE composition has a coefficient of thermal expansion that is less than that of conventional WC-Co at the same temperature and having the same metal content, thereby providing improved resistance to thermal shock and thermal fatigue related failure.

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